

# Claims

- [c1] 1.A bottle cap for fitting on a bottle including a mouth and an inner volume, the bottle cap comprising: a cover securable over the bottle mouth, the cover having an outer surface and an inner surface; a valve housing extending from the cover inner surface and positioned to be open to the bottle inner volume when the cap is secured over the mouth; a liquid flow port passing through the valve housing and the cover extending between a first opening on the valve housing and a second opening on the cover outer surface; a plunger disposed in the valve housing and moveable between a sealing position blocking liquid flow from the first opening to the second opening of the liquid flow port and an open position permitting liquid flow from the first opening to the second opening of the liquid flow port, the plunger including an drive end accessible though the second port and the plunger being biased into the blocking position but movable into the open position by applying force against the drive end.
- [c2] 2.The bottle cap of claim 1 wherein the plunger is biased by a spring.

- [c3] 3.The bottle cap of claim 1 further comprising a bore in the valve housing and wherein the plunger is slidably moveable through the bore and driven to slide in the bore when force is applied at the drive end.
- [c4] 4.The bottle cap of claim 3 wherein bore includes a seat against which the plunger is sealed when in the blocking position.
- [c5] 5.The bottle cap of claim 1 wherein the second port is sized to fit over a feed tube spike of a liquid dispensing support such that the feed tube spike is employed to apply force against the drive end of the plunger.
- [c6] 6.The bottle cap of claim 4 wherein the seat is a deformable annular member and wherein the second port is sized to fit over a feed tube spike of a liquid dispensing support such that the feed tube spike is employed to apply force against the drive end of the plunger and seals against the deformable annular member.
- [c7] 7.The bottle cap of claim 1 further comprising an air supply passage openable between the cover outer surface and the valve housing.
- [c8] 8.The bottle cap of claim 7 wherein the plunger acts as a valve to control flow through the air supply passage.

- [c9] 9.A bottle cap comprising: a cap body including a cover surface and a housing, the housing extending opposite the cover surface; a bore in the cap body and opening on the cover surface; a port opening through the housing into the bore and a plunger in the bore and including a drive end accessible through the opening, the plunger biased toward the opening but prevented from passing therethrough, the plunger when biased sealing across the port but drivable by applying force to the drive end to move the plunger to open the port, the cap body formed to fit over a mouth of a bottle with the housing extending into the bottle.
- [c10] 10.The bottle cap of claim 9 wherein the plunger is biased by a spring.
- [c11] 11.The bottle cap of claim 9 further comprising a bore in the valve housing and wherein the plunger is slidably moveable through the bore and driven to slide in the bore when force is applied at the drive end.
- [c12] 12.The bottle cap of claim 11 wherein bore includes a seat against which the plunger is sealed when in the blocking position.
- [c13] 13.The bottle cap of claim 9 wherein the second port is sized to fit over a feed tube spike of a liquid dispensing

support such that the feed tube spike is employed to apply force against the drive end of the plunger.

[c14] 14.The bottle cap of claim 12 wherein the seat is a deformable annular member and wherein the second port is sized to fit over a feed tube spike of a liquid dispensing support such that the feed tube spike is employed to apply force against the drive end of the plunger and seals against the deformable annular member.

[c15] 15.The bottle cap of claim 9 further comprising an air supply passage openable between the cover outer surface and the valve housing.

[c16] 16.The bottle cap of claim 15 wherein the plunger acts as a valve to control flow through the air supply passage.

[c17] 17.A bottle cap comprising: a cap body including a cover surface and a housing, the housing extending opposite the cover surface; a liquid flow passage passing through the cap body between a first opening on the housing and a second opening on the cover surface; an air flow passage passing through the cap body separately from the liquid flow passage, the air flow passage extending between an inside opening on the housing and an outside opening on the cover surface, the cap body formed to fit over a mouth of a bottle with the housing extending into

the bottle.

- [c18] 18.The bottle cap of claim 17 further comprising a valve to control flow through the liquid flow passage.
- [c19] 19.The bottle cap of claim 17 further comprising a valve to control flow through the air flow passage.
- [c20] 20.The bottle cap of claim 17 further comprising a bore in the cap body and opening at a port on the cover surface and wherein the liquid flow passage passes through the bore and the air flow passage passes through the bore.
- [c21] 21.The bottle cap of claim 20 further comprising a valve in the bore operable to control flow through both the liquid flow passage and the air flow passage.
- [c22] 22.The bottle cap of claim 21 wherein the valve is a plunger biased into a sealing position in the bore and including a portion capable of sealing the liquid flow passage and a portion capable of sealing the air flow passage.
- [c23] 23.The bottle cap of claim 20 wherein the second opening of the liquid flow passage is the port of the bore.
- [c24] 24.The bottle cap of claim 17 further comprising an extension tube for extending the length of the air flow

passage.

- [c25] 25. A bottle cap for fitting on a bottle including a mouth and an inner volume, the bottle cap comprising: a cover securable over the bottle mouth, the cover having an outer surface and an inner surface; a housing extending from the cover inner surface and positioned to be open to the bottle inner volume when the cap is secured over the mouth; a liquid flow passage through the housing and the cover extending between a first opening on the housing and a opening on the cover outer surface; an air flow passage through the housing and the cover extending between an inside opening on the housing and an outside opening on the cover outer surface.
- [c26] 26. The bottle cap of claim 25 further comprising a valve to control flow through the liquid flow passage.
- [c27] 27. The bottle cap of claim 25 further comprising a valve to control flow through the air flow passage.
- [c28] 28. The bottle cap of claim 25 further comprising a bore in the cap body and opening at a port on the cover surface and wherein the liquid flow passage passes through the bore and the air flow passage passes through the bore.
- [c29] 29. The bottle cap of claim 28 further comprising a valve

in the bore operable to control flow through both the liquid flow passage and the air flow passage.

- [c30] 30. The bottle cap of claim 29 wherein the valve is a plunger biased into a sealing position in the bore and including a portion capable of sealing the liquid flow passage and a portion capable of sealing the air flow passage.
- [c31] 31. The bottle cap of claim 28 wherein the second opening of the liquid flow passage is the port of the bore.
- [c32] 32. The bottle cap of claim 25 further comprising an extension tube for extending the length of the air flow passage.